

# **Handheld Devices: Overcome the Obstacles While Realizing the Benefits – St. Clair's Experience**

**Thomas L. Ague, Executive Vice President/COO, St. Clair Hospital**

**412-344-6600 x1000**

**[Tom.Ague@StClair.org](mailto:Tom.Ague@StClair.org)**

**Richard J. Schaeffer, Director of Development**

**412-344-6600 x1367**

**[Richard.schaeffer@stclair.org](mailto:Richard.schaeffer@stclair.org)**

# About St. Clair Hospital

- A 314-bed , general, acute care hospital
- Servicing 300,000 residents in 20 communities
- 100 Top Hospitals, Regional Benchmarks for Success
- 100 Top Hospitals, both Stroke and ICU
- Eclipsys 7000, Sunrise AM/PFM, Sunrise Decision Support
- PACS, Open Heart Surgery, Expansion

# Why PDAs?

- Physicians are willing to use PDAs
- The information available on the PDA will be valuable and necessary for patient care
- The PDA saves time, otherwise physicians wouldn't be using them
- The PDA, and access to the information must be intuitive and not require extensive training
- Information should be pushed to the physician PDA, so that information is there when needed, and the physician doesn't have to go get it.

# Wireless PDA Initiatives at St. Clair Hospital

## ■ PDA Project 1 - InterSign

- Real-time communication between hospital systems and physician's Pocket PC
- Goals:
  - Provide easy mechanism for verbal order signatures
  - Allow e-signature on medical documents via Pocket PC or web
  - Reduce physician sanctions, reduce VO compliance issues

## ■ PDA Project 2 - Pocket 7000 (Eclipsys 7000)

- Duplicates clinical system on a wireless Pocket PC
- Goals:
  - Transfer all functionality of Desktop PC session to Pocket PC
  - Enable the caregiver to both enter and retrieve patient information at any location including the bedside

# InterSign PDA

- 2-way communication system
- Wireless transmission to/from physician's PDA
- Delivers transcribed documents, results, patient lists, etc.
- Where required, physician e-signature attached
- All transmissions encrypted
- Access available via PDA, PC, or web
- LAN, WLAN, Cellular wide-area

# Reports being Delivered

- Lab Results
- Critical Values
- ED Reports
- H & P
- Med Renewals
- Admit Notice
- Transfer Notice
- Discharge Notice
- EEG Results
- Consults
- Verbal Order Verification
- Discharge Summary
- Med Imaging Results
- Physician Financial Record
- Operation Record
- Patient Lists
- Cardiology Results

Note: Information is extracted from a variety of systems and fed into InterSign via NetPrint Output Manager



# Web Select

Allows the physician to enter preferences for what types of information should be sent, and to which device.

## Web Select

Allows physician's to identify reports to be emailed

Current User Demographics for WELBY,MARCUS (ID: marcusw)

Demographics

Wireless

Mobile7000

Passwords!

Logout

Help

Activate Wireless Email: ☒

PDA e-mail address

PC e-mail address

Send	Report Name	Subject Line	Long Subj	Format to Width	Prompting Area
<div>only PDA</div>	ADMIT NOTICE	Admit:	<input checked="" type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	CONSULTATION	Cons Rpt:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>to PDA &amp; PC</div>	CRITICAL VALUE	Crit Val:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	DISCHARGE NOTICE	Dischrg:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	DISCHARGE SUMMARY	Dsch Sum:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>only PDA</div>	EMERGENCY DEPARTMENT	ED Rpt:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>only PDA</div>	HISTORY AND PHYSICAL	H & P:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>to PDA &amp; PC</div>	INVALID REPLY NOTIFICATION	Re: Invalid Response	<input type="checkbox"/>	<div>0</div>	None
<div>to PDA &amp; PC</div>	MED RENEWAL	Renewal:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>only PDA</div>	MEDICAL IMAGING RESULT, EMERGENCY	MI Result:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	MEDICAL IMAGING RESULT, INPATIENT	MI Result:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	MEDICAL IMAGING RESULT, PRE-REGISTERED	MI Result:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	OBSERVATION PT REG NOTICE	Admit:	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	OPERATION RECORD	Op Rec:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>to PDA &amp; PC</div>	VERBAL ORDER	Order:	<input type="checkbox"/>	<div>0</div>	<div>Top only</div>
<div>to PDA &amp; PC</div>	PATIENT LIST	Pt List	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	PHYSICIAN FINANCIAL RECORD	PFIN:	<input type="checkbox"/>	<div>0</div>	None
<div>to PDA &amp; PC</div>	TARDY REPLY NOTIFICATION	Reply Tardy	<input type="checkbox"/>	<div>0</div>	None
<div>only PDA</div>	TRANSFER NOTICE	Transfer:	<input type="checkbox"/>	<div>0</div>	None

Hint: Check "Long Subj" if you primarily read that report on a desktop PC.  
Hint: Leaving "Format to Width" as zero is compatible with the display screen on most devices.  
Hint: If "Send" is set to "Never" then the report will still be accessible through the bidi database.

Enter...

237

Page 1

Sec 1

1/1

At 5.4"

Ln 3

Col 1

REC

TRK

EXT

OVR

# Who Benefits

## ■ Physicians

- Rapid access to patient information
- Reduces time spent on paperwork
- Keeps physicians off of sanction list.
- Reduces late night calls.
- Maintains communication with physicians who are not at the hospital due to rounds schedule or rotation cycles
- Improved patient care

## ■ Hospital

- Improved relationship with physicians
- Valuable physician recruiting tool
- Compliance with regulatory agencies
- Fewer backlogs in Medical Records
- Faster billing
- Improved patient care

## ■ Patient

- Receives more responsive and appropriate care
- Shortened length of stay



# Costs for providing the PDA

## ■ PDA

- iPaq 3850 (64mb, color) \$599

## ■ Network Connectivity

- iPaq expansion jacket + wireless LAN: \$299
  - or -
- Symbol jacket + wireless LAN: \$499
  - or -
- Symbol jacket + wireless LAN + Bar code scanner: \$699
  - or -
- Wireless modem (wide area wireless): \$479

## ■ Airtime (optional, for use outside of hospital with wireless modem)

- Unlimited Airtime package: \$59/month

# Cost Justification and ROI

## ■ Faster Discharge

- Rapid delivery of information allows physicians to make faster decisions. For example, if the physician receives test results that show the patient has a hip bruise, not a fracture, the patient may be discharged a day earlier saving the hospital per diem charges.
- *If the physician saves just 2 Medicare days over a period of 1 year, the hospital has recouped its cost for the iPaq and airtime.*

## ■ Better Medication Management

- Physicians are more rapidly alerted to lab results, (i.e. showing antibiotic sensitivities) and can realize cost savings by discontinuing a costly and/or inappropriate medication faster.

## ■ Time Savings

- Physicians save time by viewing and electronically signing documents without making an extra trip to the hospital. This timesaving allows the physician more office time to see patients. Over the course of a year, if any of those extra visits result in an admission, the physician's PDA device has probably paid for itself.

## ■ Workflow

- By increasing the speed at which documents are signed, chart coding can be accelerated, leading to faster billing.

# Physician Agreement

- A legal document
- Establishes ownership of device and information
- Establishes obligation to return device
- Offer buyout in some situations
- Adherence to security, no tampering policy
- Procedures to immediately report theft or loss
- Prohibits use of PDA to collect other hospital patient data in an unsecured, unencrypted fashion
- Third party applications being loaded on device. Reserve a portion of storage for St. Clair applications and data.
- Restrictions on use of cellular capabilities
- Penalties - 1<sup>st</sup> offense: re-affirm and retrain  
2<sup>nd</sup> offense: forfeit use

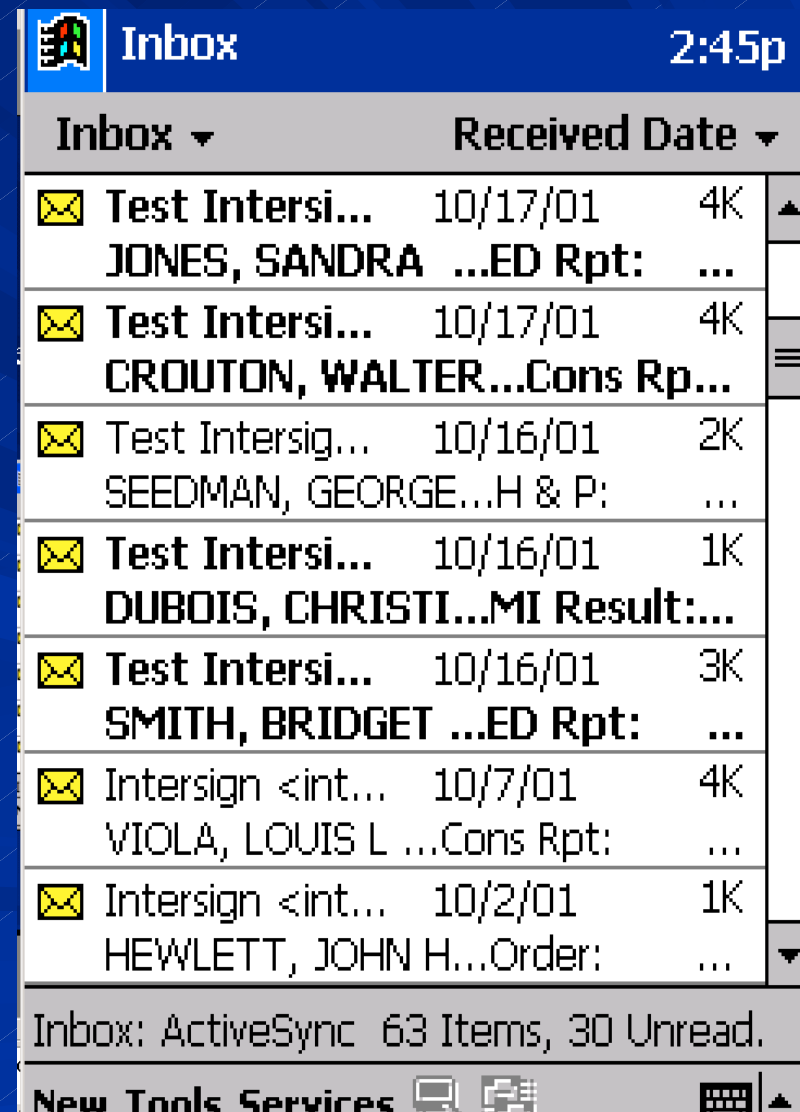
# Physician assistance with 3<sup>rd</sup> party applications

- Pocket PC is a new platform with a learning curve
- To be successful we must provide training and assistance in finding/loading/using productivity tools
- Handwriting recognition, Drug Reference, Drug to Drug Interaction, Prescription Writing, etc.
- Promote personal interest applications too, anything to get the most out of the device
- By providing assistance, the Hospital/Physician relationship is strengthened

# Reports delivered to PDA (Early Development)

To the right, the iPaq Inbox is shown with various messages available to the user.

The Inbox was easy for the physicians to understand, but it did not offer enough speed, flexibility, and intelligence. It was eventually replaced with a much better user interface.





The screenshot shows the iPaq Inbox interface. At the top, there is a header bar with the word "Inbox" on the left and the time "2:45p" on the right. Below the header is a table with two columns: "Inbox" and "Received Date". The table lists several messages, each with an envelope icon, a subject line, a date, and a size. The messages are as follows:

Inbox	Received Date
Test Intersi... JONES, SANDRA ...ED Rpt: ...	10/17/01 4K
Test Intersi... CROUTON, WALTER...Cons Rp...	10/17/01 4K
Test Intersig... SEEDMAN, GEORGE...H & P: ...	10/16/01 2K
Test Intersi... DUBOIS, CHRISTI...MI Result:...	10/16/01 1K
Test Intersi... SMITH, BRIDGET ...ED Rpt: ...	10/16/01 3K
Intersign <int... VIOLA, LOUIS L ...Cons Rpt: ...	10/7/01 4K
Intersign <int... HEWLETT, JOHN H...Order: ...	10/2/01 1K

At the bottom of the screen, there is a status bar that reads "Inbox: ActiveSync 63 Items, 30 Unread." and a navigation bar with the text "New Tools Services" and several icons.

# Verbal Order Confirmation - Early Development

Physician would read the report and then tap Reply to sign it. On the right, the multiple choice option had to be manually entered. ***This approach no longer used.***

 **Inbox** 2:19p 

From: Intersign






Subject:



Sent: Tue 10/2/01 9:46 AM

HEWLETT, JOHN H  
MR: 800248 ACCT:8000632  
TCC 5411TC F 47  
MD: WELBY,MARCUS

Please confirm

BUN, <10/01/01>, (0082)

New Edit     

 **Inbox** 2:49p 






From: Intersign

Subject:

Sent: Tue 10/2/01 9:46 AM

Enter Option:  
1. Yes, confirm  
2. No, deny  
Addit. Comment:  
=====

HEWLETT, JOHN H  
MR: 800248 ACCT:8000632  
TCC 5411TC F 47  
MD: WELBY,MARCUS

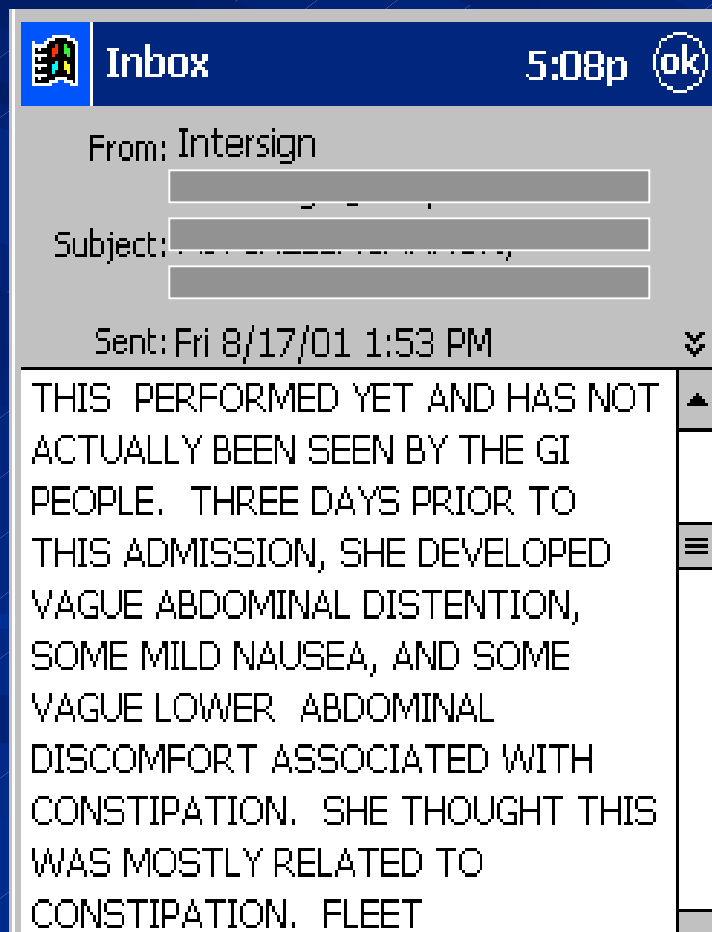
New Edit     





# Transcribed Report on the PDA

(Early Development)

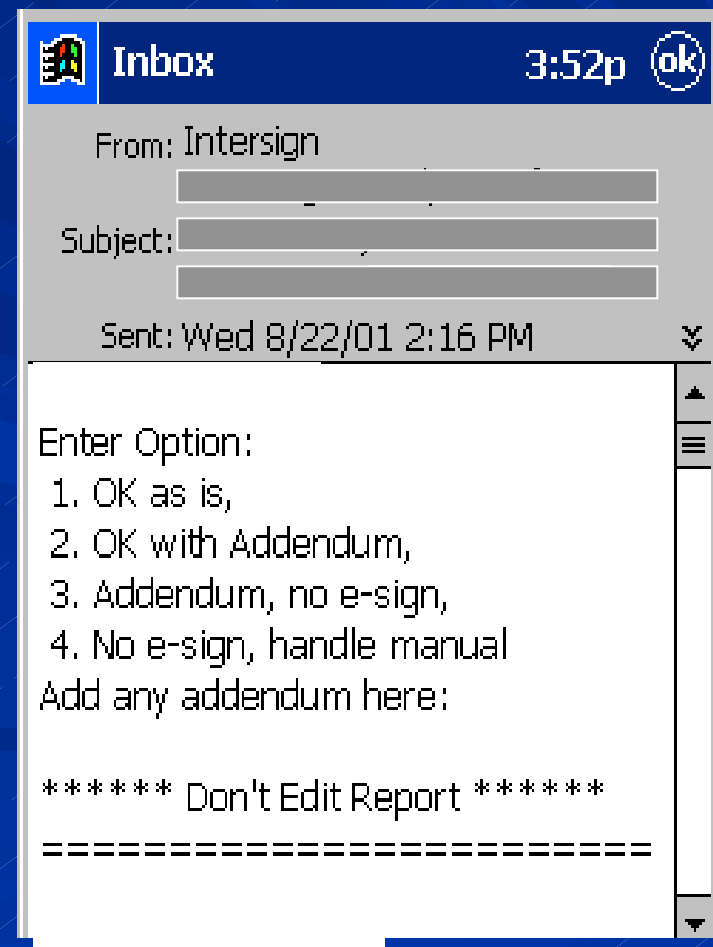
This is an example of a transcribed report. The user can scroll through it. Text is very readable. Screen on right shows response options available for a transcribed report. ***This approach is no longer used.*** (Note: some data grayed out for privacy.)





 **Inbox** 5:08p 

From: Intersign  
Subject: [REDACTED]  
Sent: Fri 8/17/01 1:53 PM

THIS PERFORMED YET AND HAS NOT ACTUALLY BEEN SEEN BY THE GI PEOPLE. THREE DAYS PRIOR TO THIS ADMISSION, SHE DEVELOPED VAGUE ABDOMINAL DISTENTION, SOME MILD NAUSEA, AND SOME VAGUE LOWER ABDOMINAL DISCOMFORT ASSOCIATED WITH CONSTIPATION. SHE THOUGHT THIS WAS MOSTLY RELATED TO CONSTIPATION. FLEET



 **Inbox** 3:52p 

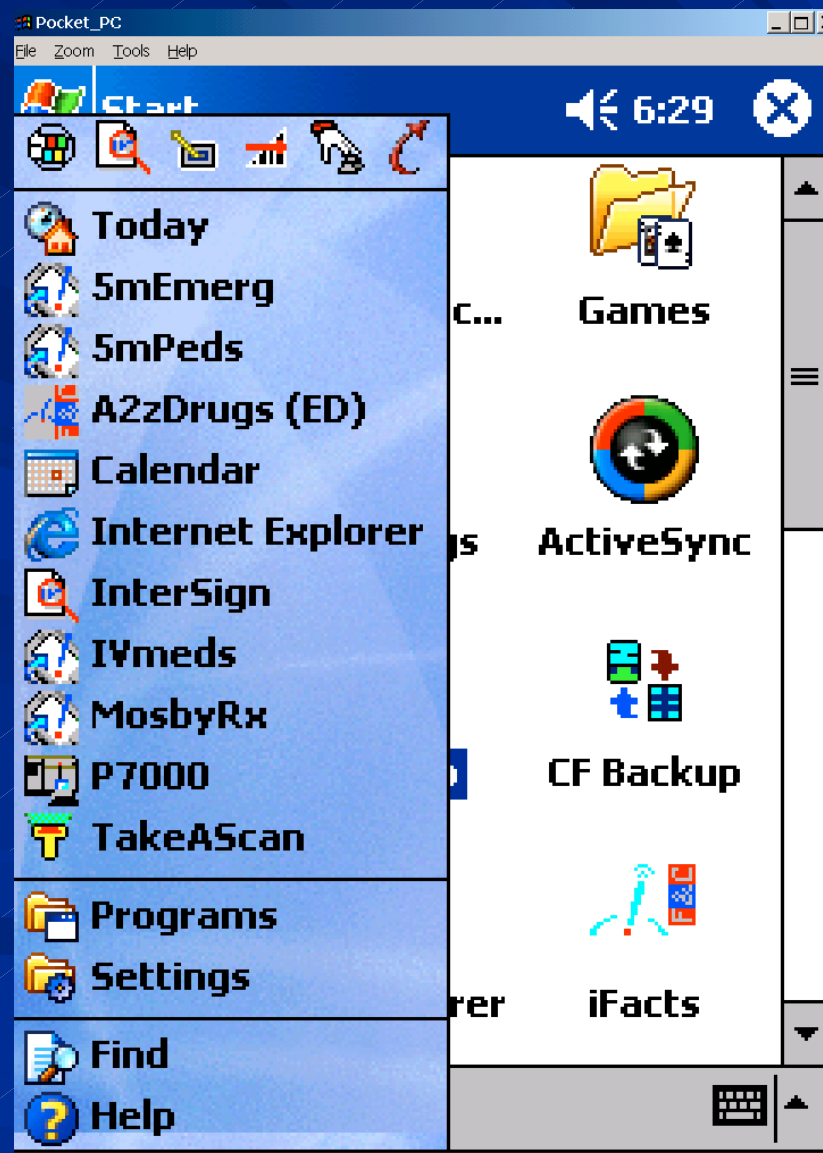
From: Intersign  
Subject: [REDACTED]  
Sent: Wed 8/22/01 2:16 PM

Enter Option:  
1. OK as is,  
2. OK with Addendum,  
3. Addendum, no e-sign,  
4. No e-sign, handle manual  
Add any addendum here:  
  
\*\*\*\*\* Don't Edit Report \*\*\*\*\*  
=====

# Enhancements Requested by Physicians

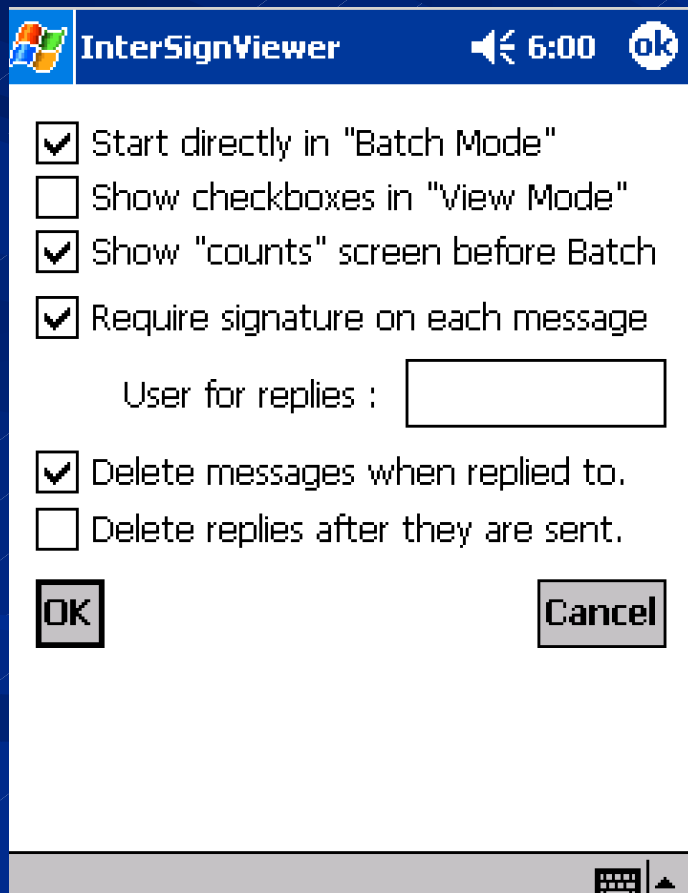
- More convenient security features
- Control over the number of reports requiring an e-signature
- Filtering of reports by category
- Ability to skip to the end of signing sequence without losing prior work
- Auto deletion once document is signed

# New InterSign Client for iPaq



# Added Flexibility to Meet Physician's Needs

Custom configuration screens are configured during physician training.



InterSignViewer 6:00 ok

☒ Start directly in "Batch Mode"

☐ Show checkboxes in "View Mode"

☒ Show "counts" screen before Batch

☒ Require signature on each message

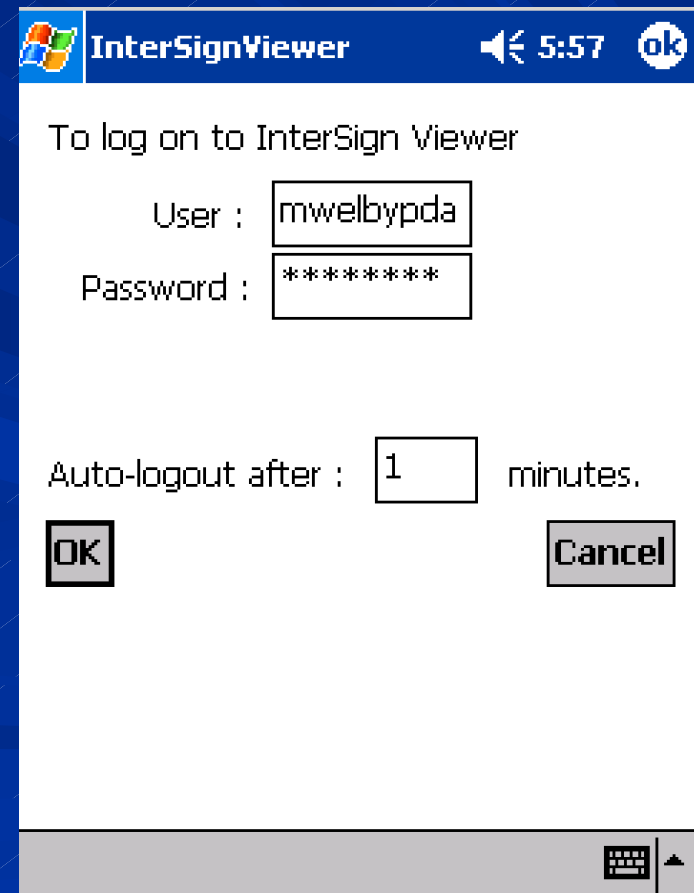
User for replies :

☒ Delete messages when replied to.

☐ Delete replies after they are sent.

OK Cancel

This is a screenshot of the InterSignViewer configuration window. The title bar shows the application name and a timer at 6:00. The window contains several checkboxes for configuring the application's behavior. The 'User for replies' field is currently empty. At the bottom, there are 'OK' and 'Cancel' buttons.



InterSignViewer 5:57 ok

To log on to InterSign Viewer

User :

Password :

Auto-logout after :  minutes.

OK Cancel

This is a screenshot of the InterSignViewer login window. The title bar shows the application name and a timer at 5:57. The window prompts the user to log on by entering a username and password. The username field contains 'mwelbypda' and the password field is masked with asterisks. There is also an auto-logout setting set to 1 minute. At the bottom, there are 'OK' and 'Cancel' buttons.

The physician must login to access the data. At all other times the data is encrypted.

Pocket\_PC

File Zoom Tools Help

InterSignViewer 2:29 ok

To access InterSign Viewer, please enter the correct user name and password in the fields below, then press "ok".

Sign on User ID :

Sign on Password :

OK Cancel

Pocket\_PC

File Zoom Tools Help

InterSignViewer 2:29 ok




<input type="checkbox"/> Consult	0
<input type="checkbox"/> Discharge Summary	0
<input type="checkbox"/> Emerg. Dept Reports	0
<input checked="" type="checkbox"/> History & Physical	2
<input checked="" type="checkbox"/> Med's Renewal	2
<input checked="" type="checkbox"/> Operation Record	1
<input checked="" type="checkbox"/> Orders	1
<input type="checkbox"/> Other (no resp) reports	2

OK Cancel

After review, physician can e-sign, addend, skip, or advance to end of sequence.

Pocket\_PC

File Zoom Tools Help

 **InterSignViewer**  2:30 

---

**Sent: 1/25/02 5:51:19 PM**  
**Subj: SEEDMAN, GEORGE...H & P:**

---

**SEEDMAN, GEORGE I**  
**MR: 587423 ACCT:9564123**  
**DSURG M 48**  
**MD: SCOGLY, WILLIAM M.D.**  
**Req#: 6287-0219**

**Please confirm**



**FOR SURGERY TOMORROW - ON 10/15.**

**HISTORY OF PRESENT ILLNESS:**  
**THIS IS A 48 YEAR OLD GENTLEMAN**

--- Enter Option: ---




☐ Additional comments      Msg 1 of 6

**Enter**      **Skip**      **Jump to End**

Pocket\_PC

File Zoom Tools Help

 **InterSignViewer**  2:31 

---

**Sent: 1/25/02 5:51:19 PM**  
**Subj: SEEDMAN, GEORGE...H & P:**

---

**SEEDMAN, GEORGE I**  
**MR: 587423 ACCT:9564123**  
**DSURG M 48**  
**MD: SCOGLY, WILLIAM M.D.**  
**Req#: 6287-0219**

**Please confirm**

**FOR SURGERY TOMORROW - ON 10/15.**



**HISTORY OF PRESENT ILLNESS:**  
**THIS IS A 48 YEAR OLD GENTLEMAN**

--- Enter Option: ---

1. OK as is,  
2. OK with Addendum,  
3. Addendum, no e-sign,

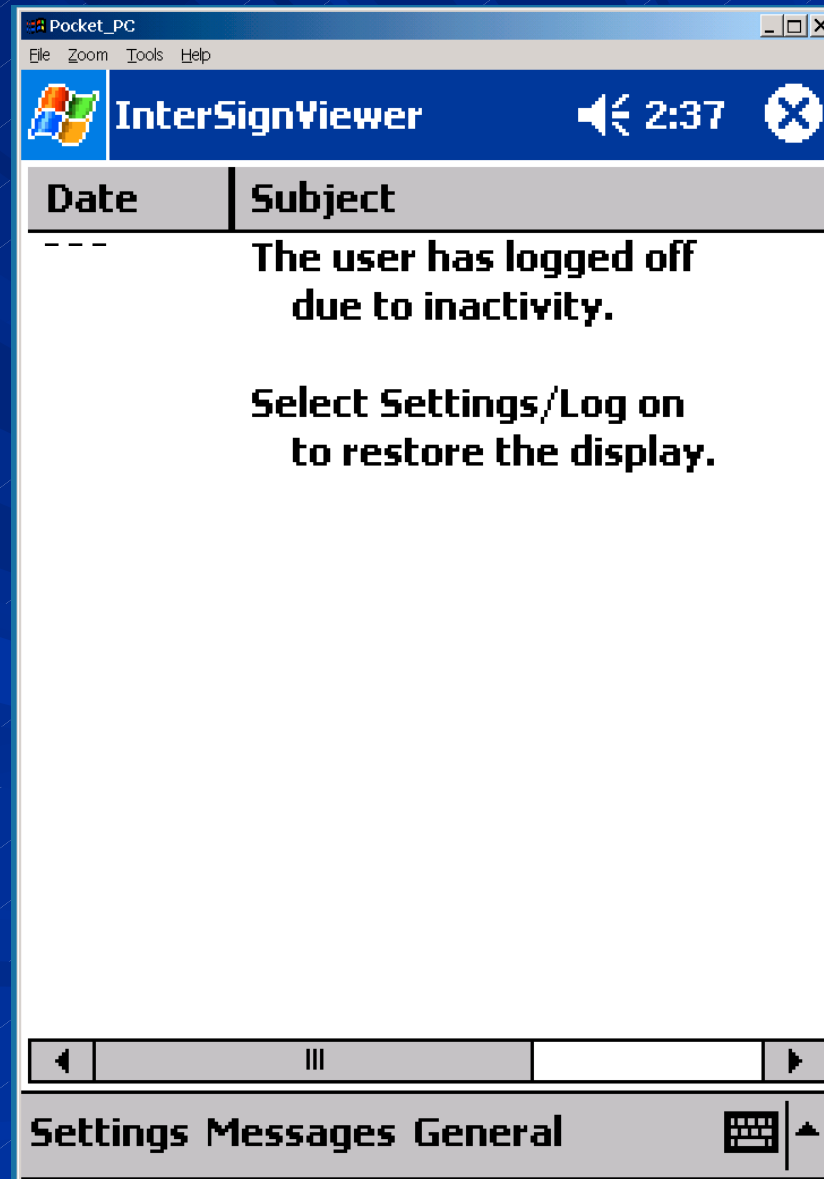
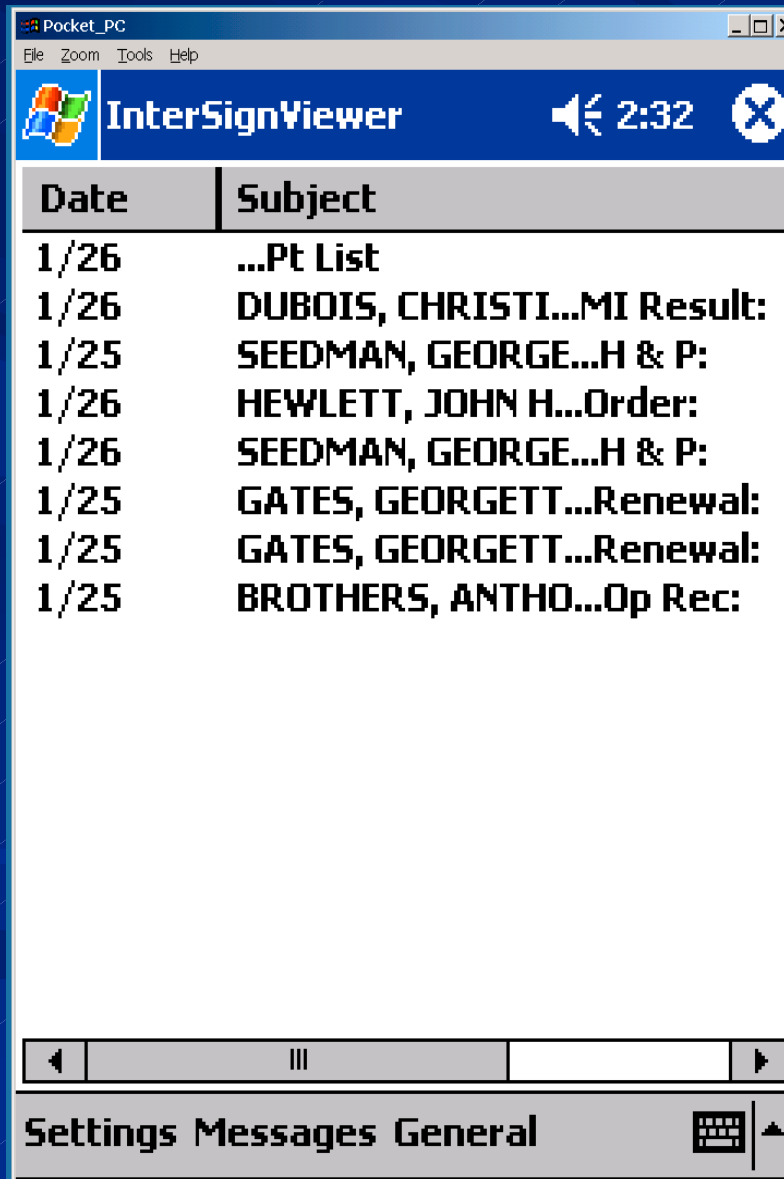
of 6

**Jump to End**



The pick list for all messages is shown on the left. On the right, the auto logout screen is shown. At this time all reports are re-encrypted.



# Future InterSign PDA features

- Detonation – to handle loss/theft situations
- Archival Database – Pocket SQL based
- Remote installs and upgrades

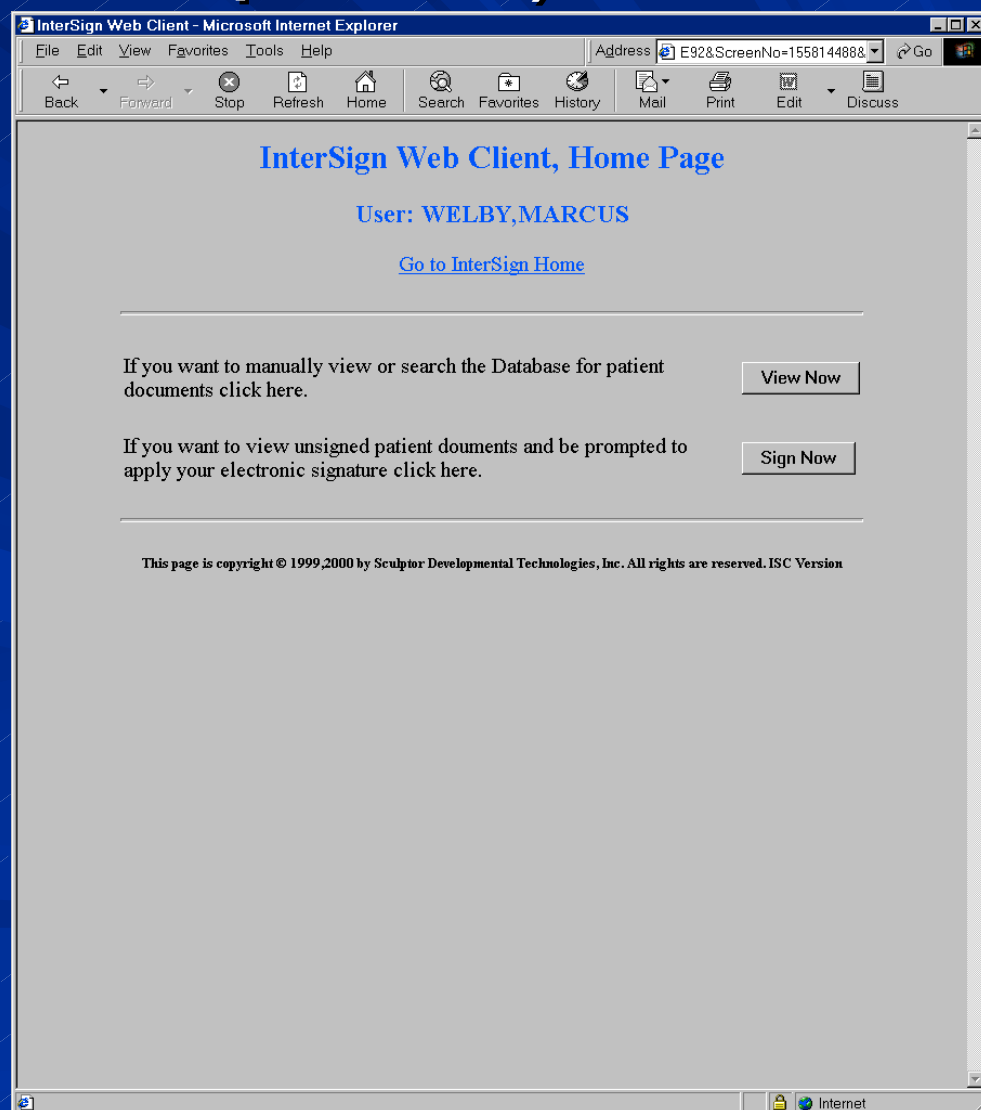
# Web Enabled InterSign (Early Development)

Although handheld devices are very useful in mobile situations, many users like to use a full screen PC when it is convenient and available.

To enable the physician to use a browser on a hospital, home, or office PC, InterSign was Web-enabled. InterSign is frequently used via a wireless laptop on mobile cart.

This method of access has proved to be very popular with physicians.

This screen evolved over time to offer additional features and flexibility.



# Web Enabled InterSign E-Sign mode (Early Development)

Physician is prompted for a signature on each unsigned document. Physician can sign it, skip it, or return to home page.

InterSign Web Client, ESign Pages

User: WELBY, MARCUS

[Go to InterSign Home](#)

Please confirm

Enter Skip Home

Enter Option: 1. Yes, confirm

Addit. Comment:

Entry Date Oct 23 2001 12:41PM

Report Type ORDER

Patient HEWLETT, JOHN H

Phys WELBY, MARCUS

Med Rec No 800248

Body of Message

Text of body:

BUN, <10/23/01>, (0082)

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Physician can quickly choose a response from the drop down list and optionally add comments or addendum.

InterSign Web Client, ESign Pages

User: WELBY, MARCUS

[Go to InterSign Home](#)

Please confirm

Enter Skip Home

Enter Option: 2. OK with Addendum

Add any addendum here:

Entry Date Oct 23 2001 11:59AM

Report Type EMERGENCY DEPARTMENT

Patient SMITH, BRIDGET A

Phys WELBY, MARCUS

Med Rec No 548621

Req No 0288-0131

Body of Message

Text of body:

CHIEF COMPLAINT:  
VOMITING AND DIARRHEA.

HISTORY OF PRESENT ILLNESS:  
PATIENT IS A 22-YEAR-OLD WHITE FEMALE WHO COMPLAINS OF A TWO DAY HISTORY OF NAUSEA, VOMITING AND WATERY BROWN DIARRHEA. SHE SAID SHE HAS HAD AT LEAST EIGHT OR NINE EPISODES OF VOMITING AND DIARRHEA THROUGHOUT THE DAY. SHE GETS SOME CRAMPY ABDOMINAL PAIN JUST BEFORE THE VOMITING, BUT NO PAIN BETWEEN THE VOMITING. SHE HAS NOT BEEN ABLE TO KEEP DOWN FOODS. SHE HAS NOT BEEN ABLE TO

# Web InterSign View Mode (early development)

In view mode the physician can search/sort the database for all patient reports.

By clicking the folder icon the detail of the report is displayed.

InterSign Web Client - Microsoft Internet Explorer

Address: rsignClient/IntersignClient.cgi

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

### InterSign Web Client, Main Index

User: WELBY,MARCUS

[Go to InterSign Home](#)

Sort Options

Primary Patient Name (asc)

Secondary Report Type (asc)

Tertiary Processing Date (asc)

Search Options

BROTHERS

Sort Page

Search Primary

Go to the [Next Page](#)

	Entry Date	Type	Report Type	Patient	Med Rec No
	Oct 23 2001 12:00PM	Query	OPERATION RECORD	BROTHERS, ANTHONY L	982234
	Oct 23 2001 12:00PM	1-Way	ADMIT NOTICE	CHOCKE, JOHN P	965138
	Oct 23 2001 12:00PM	1-Way	TRANSFER NOTICE	CHOCKE, JOHN P	965138
	Oct 23 2001 11:59AM	Query	CONSULTATION	CROUTON, WALTER C	965234
	Oct 23 2001 12:05PM	1-Way	MEDICAL IMAGING RESULT	DUBOIS, CHRISTINE S	587624
	Oct 23 2001 12:01PM	Query	MED RENEWAL	GATES, GEORGETTE K	947236
	Oct 23 2001 12:01PM	Query	MED RENEWAL	GATES, GEORGETTE K	947236
	Oct 23 2001 12:01PM	Query	MED RENEWAL	GATES, GEORGETTE K	947236
	Oct 23 2001 12:41PM	Query	ORDER	HEWLETT, JOHN H	800248

Done Internet

InterSign Web Client - Microsoft Internet Explorer

Address: 2908850&bdid-02-32877802

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss

### InterSign Web Client, Record View Page

User: WELBY,MARCUS

[Go to InterSign Home](#)

[Return to Main List](#)

[View Partner Message](#)

Entry Date Oct 23 2001 11:59AM

Message Type Query

Status Complete (r)

Report Type HISTORY AND PHYSICAL

Patient SEEDMAN, GEORGE I

Phys WELBY,MARCUS

Med Rec No 587423 Req No 6287-0219

Body of Message

Text of body:

FOR SURGERY TOMORROW - ON 10/15.

HISTORY OF PRESENT ILLNESS:

THIS IS A 48 YEAR OLD GENTLEMAN THAT HAS A CONTINUED DYSPHAGIA MORE OR LESS TO THE RIGHT HYPOPHARYNGEAL AREA. HE HAS BEEN EXAMINED IN THE OFFICE, NOTHING WAS FOUND. IT APPEARED THAT HE MIGHT HAVE REFLUX AND WAS TREATED FOR THAT. IT SEEMED TO HELP SOMEWHAT. HE HAS ALSO BEEN TRIED ON SOME NASAL AND SINUS DRAINAGE MEDICINES.

HE HAD A RECENT CAT SCAN WHICH SHOWED A QUESTIONABLE FULLNESS IN THE LEFT VALLECULA. ON REVIEW OF THAT CAT SCAN, THERE IS A QUESTION WHETHER THAT IS THERE AND THAT IS OPPOSITE OF HIS SYMPTOMS. HE HAS A SIGNIFICANT HISTORY OF SMOKING.

Done Internet

# Enhancements Requested by Physicians

- Summary table of reports
- Control over the number of reports requiring an e-signature
- Filtering of reports by category
- Filtering of report by date
- Ability to skip to the end of signing sequence without losing prior work
- Group signing capability
- Customization of Group settings



WELBY,MARCUS

Unread Report Types	Total
MEDICAL IMAGING RESULT	1

Your unanswered reports to display for signing (from cut-off date of 04/16/2002 to present)	Total	Include
ORDER	1	<input checked="" type="checkbox"/>
HISTORY AND PHYSICAL	1	<input checked="" type="checkbox"/>
DISCHARGE SUMMARY	0	<input checked="" type="checkbox"/>
CONSULTATION	1	<input checked="" type="checkbox"/>
OPERATION RECORD	1	<input checked="" type="checkbox"/>
EMERGENCY DEPARTMENT	1	<input checked="" type="checkbox"/>

If you want to Logoff

Logoff

If you want to manually view or search the database for patient documents click here.

View Now

If you want to view your unsigned patient documents and be prompted to apply your electronic signature click here.

Sign Now

**Report signing settings (optional):**

The signing process is customized to show only those reports which have arrived since my custom cut-off date of 04/16/2002. Set cut-off date to

current cut-off (04/16/2002)

Click here

to update your unanswered reports table on new cut-off date selection.

If you want to view your group's unsigned patient documents and be prompted to apply your electronic signature click here.

Sign for Physician Group

WELBY,MARCUS

GROUP ACCESS

Group unanswered reports to display for group signing(per cut-off below dates to present)	Total	Include
ORDER	2	<input checked="" type="checkbox"/>
HISTORY AND PHYSICAL	1	<input checked="" type="checkbox"/>
DISCHARGE SUMMARY	0	<input checked="" type="checkbox"/>
CONSULTATION	1	<input checked="" type="checkbox"/>
OPERATION RECORD	1	<input checked="" type="checkbox"/>
EMERGENCY DEPARTMENT	1	<input checked="" type="checkbox"/>

If you want to Logoff

Logoff

If you want to return back to your *individual* Home

My Home

**Customization via a group-level cutoff date**

Sign for Physician Group

Optional settings:

The group signing process is customized to show only those reports which have arrived since my group's custom cut-off date of 04/16/2002.

Set cut-off date to 

Click here

to update group unanswered reports table on new cut-off date selection.

If you prefer customization via group member specific cutoff dates,  
click here

Customize using member cut-offs

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WELBY,MARCUS

GROUP ACCESS

Group unanswered reports to display for group signing(per cut-off below dates to present)	Total	Include
ORDER	3	<input checked="" type="checkbox"/>
HISTORY AND PHYSICAL	1	<input checked="" type="checkbox"/>
DISCHARGE SUMMARY	0	<input checked="" type="checkbox"/>
CONSULTATION	1	<input checked="" type="checkbox"/>
OPERATION RECORD	1	<input checked="" type="checkbox"/>
EMERGENCY DEPARTMENT	1	<input checked="" type="checkbox"/>

If you want to Logoff

Logoff

If you want to return back to your *individual* Home

My Home

**Customization via group member specific cutoff dates**

Sign for Physician Group

Optional settings:

The group signing process is customized to show only those reports which have arrived since my group's custom cut-off date of

Include Group member

Limit records to

- |   |                                  |
|---|----------------------------------|
| <input checked="" type="checkbox"/> WINCHESTER, CHARLES | include all records (04/19/2002) |
| <input checked="" type="checkbox"/> WELBY, MARCUS       | user's cut-off (04/16/2002)      |
| <input checked="" type="checkbox"/> BURNS, FRANK        | 3 days ago                       |

Click here

to update group unanswered reports table on new cut-off date selection.

If you prefer customization via a group-level cutoff date, click here

Customize using group cut-off

WELBY,MARCUS

[Group Access](#)Confirm by entering  
an option:

1. Yes, confirm

Enter

Skip

Logoff

Jump to end

Addit. Comment:

**Report Type**

ORDER

**Patient**

BENSON, ROBERT G

**Med Rec No**

661744

**Phys**

WINCHESTER, CHARLES

**Entry Date**

2002-04-19 12:37

PROCHLORPERAZINE (COMPAZINE) 10MG, IM, Q4H PRN, &lt;04/19/02 12:33-...&gt;, (0083)

ACETAMINOPHEN (TYLENOL) 325MG CAPLET, #2, PO, Q6H PRN, &lt;04/19/02 12:33-...&gt;, (0083)

LASIX 20MG PO DAILY (09), (04/20/02 09:00-...), (0083)

H&amp;H BATT, TODAY, (04/19/02), (0083)

DIET: CLEAR LIQUID, NO CAFFEINE, NO RED JELLO, &lt;04/19/02&gt;, (0083)

GEN.DIAGNOSTICS: ABDOMEN SERIES -7576, INDICATIONS: NAUSEA/VOMITING, DIARRHEA, SCHEDULE: TODAY, (04/19/02), (0083)

[These are not my group's patients \(logoff\)](#)

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## Viewing InterSign reports that do not require an e-signature

InterSign (TEST) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail

WELBY, MARCUS

Go to [My Home](#), or [Logout](#)

Sort Options

1st Patient name (asc) Select sort options at left then click ...

2nd none

3rd none

Sort Page

Search Options

Search by name

Select Search Criteria at left then click...

Search

Patient List Type

☐ Mine

☒ Group

☐ Master

Adjust list

Go to the [Next Page](#)

Patient	DOB	MRN	Gender	View
BENSON, ROBERT G	03/01/1954	661744	M	results all
BROTHERS, ANTHONY L	06/20/1924	982234	M	results all
CHOCKE, JOHN P	12/06/1923	965138	M	results all
CROUTON, WALTER C	09/28/1931	965234	M	results all
CRVELEV, DIAG	06/26/1948	800253	M	results all
CRVELEV, INPAT	03/15/1988	800308	F	results all
DUBOIS, CHRISTINE S	05/22/1956	587624	F	results all
GOTTERMEYER, JAMES J	03/01/1954	641861	M	results all
HEWLETT, JOHN H	01/02/1954	800248	F	results all
JONES, SAMUEL	07/22/1971	956324	M	results all

Go to the [Next Page](#)

[These are not my patients \(logout\)](#)

Intersign (TEST) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

WELBY,MARCUS

Go to [My Home](#), [Logout](#), or [Patient List](#)

Sort Options

1st  Select sort options at left then click ...







2nd

3rd

Search Options

Search by Name

Select Search Criteria at left then click...

	Entry Date	Type	Report Type	Patient	Med Rec No
	4/23/2002 00:41 AM	1-Way	LAB CUMMULATIVE SUM	DUBOIS, CHRISTINE S	587624
	4/22/2002 04:32 PM	1-Way	STAT LAB RESULT	DUBOIS, CHRISTINE S	587624
	4/22/2002 04:45 PM	1-Way	CRIT LAB VALUE	DUBOIS, CHRISTINE S	587624
	4/22/2002 03:08 PM	1-Way	CARDIAC CATH RESULT	DUBOIS, CHRISTINE S	587624
	4/22/2002 02:31 PM	1-Way	CARDIOLOGY RESULT	DUBOIS, CHRISTINE S	587624
	4/22/2002 12:06 AM	1-Way	MEDICAL IMAGING RESULT	DUBOIS, CHRISTINE S	587624

Done Local intranet



Intersign (TEST) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail

WELBY,MARCUS [Access Challenge](#)

**User: WELBY,MARCUS**

**All document access is restricted to authorized personnel and is monitored. At this time your relationship to the patient is unknown to InterSign. Please provide your reason for accessing this patient's information.**

---

Please type in a reason

OR select the appropriate reason.

**THEN**

- No reason given
- See type-in reason
- No reason given
- This is an emergency situation
- I am or my group is primary care provider
- I am or my group is consulting
- I am or my group is covering for primary

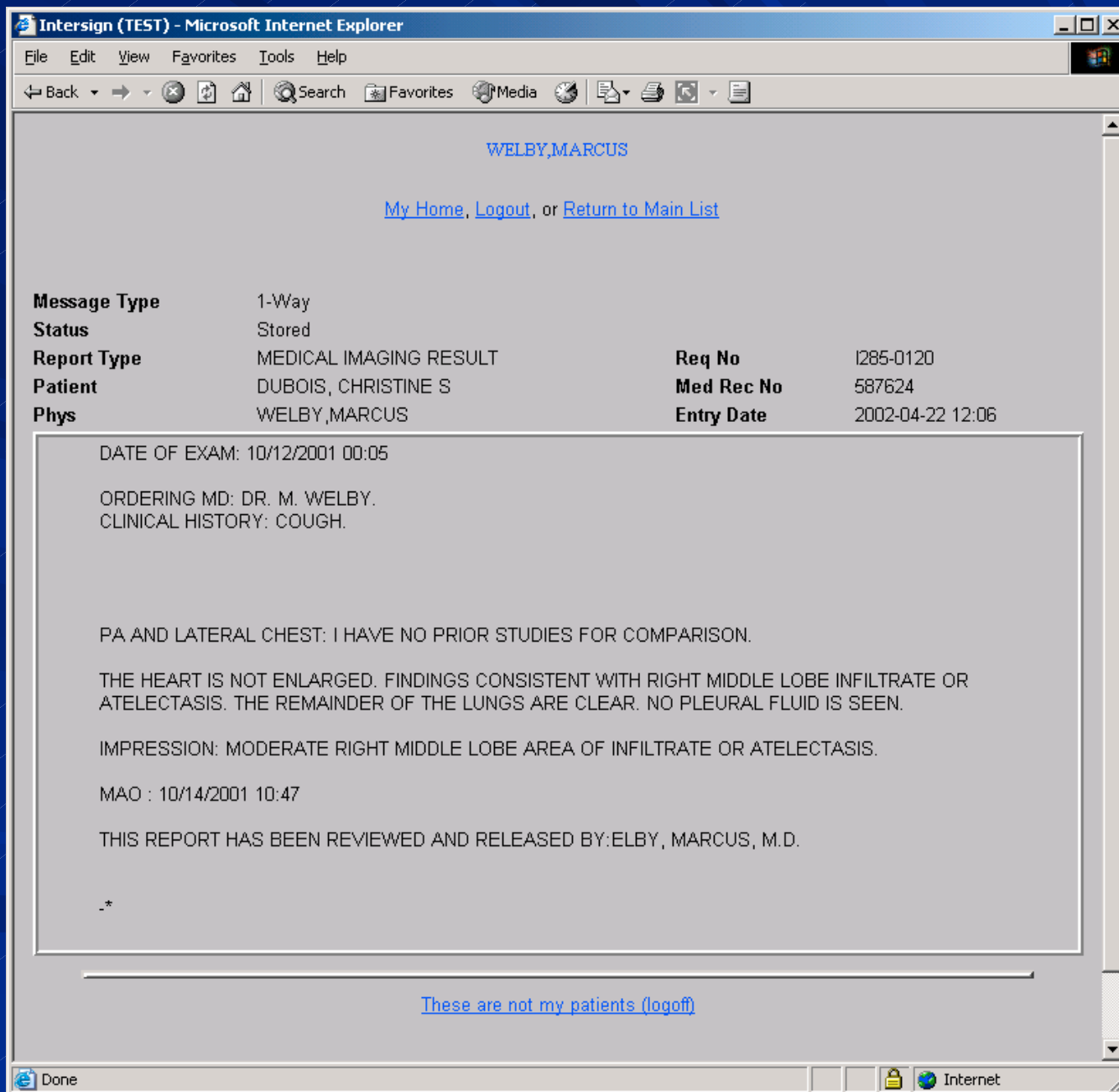
If you want to cancel request

If you want to Logoff

---

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Done Local intranet



Intersign (TEST) - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Mail

WELBY,MARCUS

[My Home](#), [Logout](#), or [Return to Main List](#)

<b>Message Type</b>	1-Way		
<b>Status</b>	Stored		
<b>Report Type</b>	LAB RESULT	<b>Req No</b>	
<b>Patient</b>	DUBOIS, CHRISTINE S	<b>Med Rec No</b>	587624
<b>Phys</b>	WELBY,MARCUS	<b>Entry Date</b>	2002-02-27 12:30

DUBOIS, CHRISTINE S

MR#:587624      SEX:F      AGE:46Y      BIRTH:05/22/1956

DOCTOR:WELBY, MARCUS M.D.

1050 BOWER HILL RD      SUITE 837      ST CLAIR HOSPITAL LABORATORY

PITTSBURGH PA 15243      1000 BOWER HILL ROAD

PITTSBURGH, PA 15243

MARTHA R. CLARKE,MD, MEDICAL DIRECTOR

===== PHYSICIAN COPY FOR DR: UPMC/SHHS HOME CARE =====

H7457      COLL: 02/27/2002 12:05 REC: 02/27/2002 12:28

BUN	PENDING		
CREATININE	PENDING		
ELECTROLYTES	PENDING		
H&H			
HEMOGLOBIN	12.2	[12.0-16.0]	GM/DL
HEMATOCRIT	36.7	[37.0-47.0]	%

Done Local intranet

# E-Signatures vs. Digital Signatures

- E-Sign act defines an ***electronic signature*** as an electronic sound, symbol, or process attached to a record.
- The US Digital Signature Standard describes a ***digital signature*** as utilizing private and public encryption keys.
- Digital Signatures are a type of E-Signature
- ASTM Guide for Electronic Authentication of Health Care Info is not restricted to dig sig.
- HIPAA security rule implied a requirement for digital signature. That requirement was then removed because it was viewed as impractical.

# Electronic Signatures

- Department of Justice Guidelines (to avoid deficiency)
  - Unique to Signer
  - Under Signer's sole control
  - Capable of being verified by third party
  - Linked to the data
- Secure Messaging Guidelines
  - Prevent Masquerading (Authentication)
  - Prevent Viewing (Encryption)
  - Prevent Tampering (Integrity Protection)
  - Prevent Denial of Send (E-Signature)
  - Prevent Denial of Receipt (Audit functions)

# Digital Signature and wireless PDAs

- Processor performance in a Pocket PC can be challenged by some encryption techniques
- Public keys must be retrieved from Certificate Authority
- Remote connections may be delayed by the third party involvement



# PDA Challenge – Screen Size

- Screen size
  - When to port an application
  - When to create a new user interface
- Intelligent use of the Virtual Keyboard
  - Not ideal for large amounts of data entry
  - Auto activate and Auto deactivate
- Add edit boxes to type-in fields
- Customize the fonts to the application
- Battery Life
  - Bright color screen consumes power
  - Must implement power timeouts
  - Timeouts require re-entry of security

# PDA Challenge – Convenience vs. Security

## ■ The Perfect PDA:

- unlimited battery life
- screen resolution to display lots of data
- always powered on
- always recognize its authorized user
- require no security
- detect location and communicate appropriately
- always be attached at high speeds

# PDA Challenge – Convenience vs. Security

## ■ The real world PDA

- Limited battery
- Limited screen
- Prone to theft and loss
- Requires several layers of security
- Requires multiple communication cards
- Slow remote operation

# PDA Challenge – Convenience vs. Security (cont.)

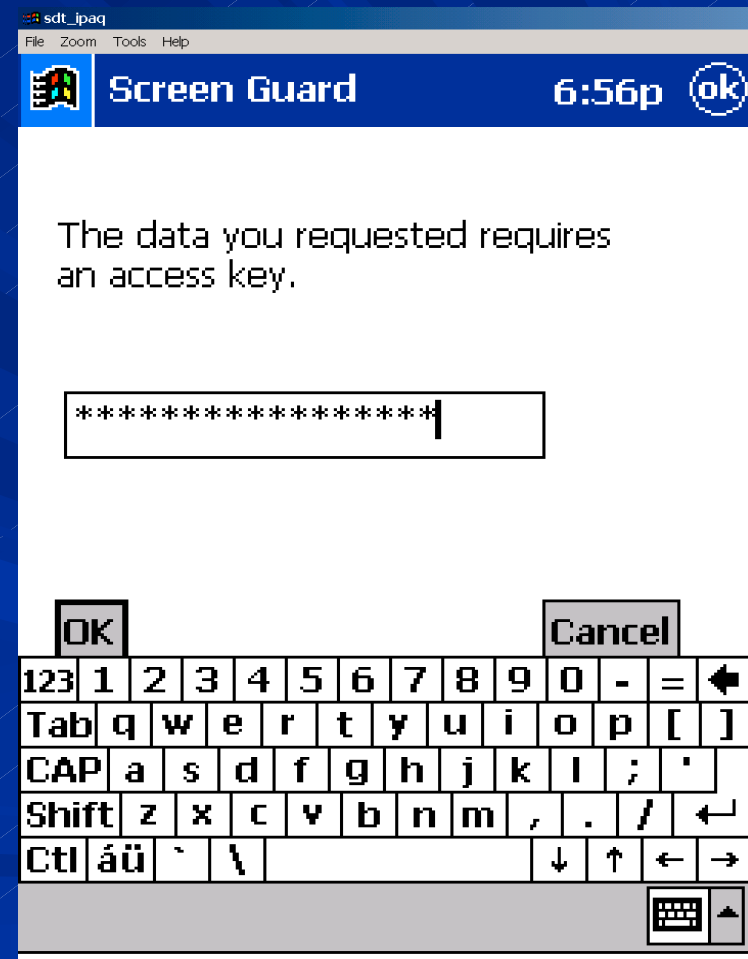
- Device and Application timeouts
  - Screen timeouts
  - Power timeouts
- Timeouts function as an activity indicator
- Timeouts require re-entry of security
- Security re-entry impedes rapid use
- Physician Feedback: “If I have to enter a detailed password every time I pull the PDA out of my pocket, then I will pull it out of my pocket less often.”

# PDA Challenge – Convenience vs. Security (cont.)

- Finding middle ground on security re-entry
  - Examine the usage pattern and security risk
  - Activate full security for those who desire the benefits
  - Embed security at the application layer before applying a solution that globally limits the device
  - When possible, burden the application, not the user
  - Apply device-based security when it is transparent to the user
  - Avoid using applications that don't inherently include adequate security (i.e. Contacts, Inbox, etc.)
  - Utilize the flexibility available for configuring security and battery settings (i.e. 1-minute re-login)

# PDA Challenge – Convenience vs. Security (cont.)

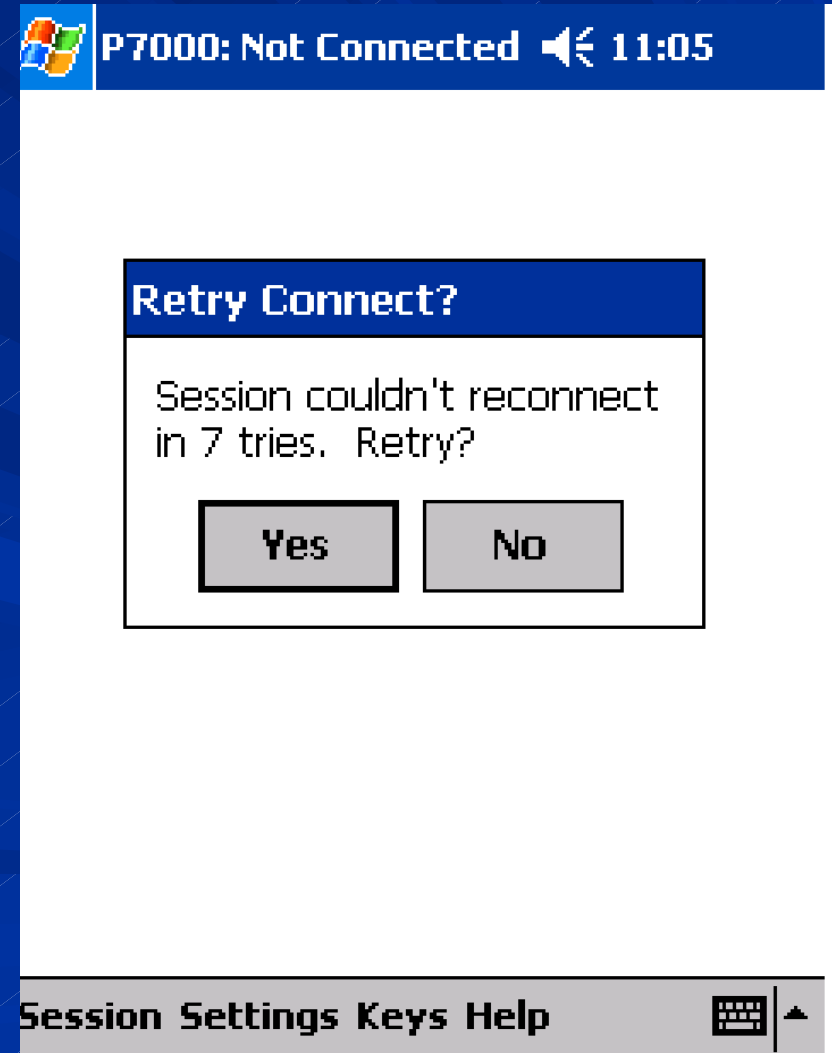
- Natively, PocketPCs do not have adequate protection for patient data
- Many third party utilities are either awkward or inadequate.
- Supplemental security for the PocketPC was developed
- Requires the user to enter an access key any time secure data needed to be viewed
- This barrier solution was eventually replaced with mechanisms to encrypt all patient data while at rest





# PDA Challenge – Convenience vs. Security (cont.)

- Interruptions must be handled to protect patient privacy
- Wireless dead spot
- Roaming off the cell
- Leaving the premises
- Ejecting wireless card
- Network failure
- Device losing power
- Policy: re-establish pathway within time limits



# PDA Challenge - Speed vs. Security (cont.)

- Physician Feedback – “If the PDA requires six taps to apply an electronic signature, it is not as fast as my pen.” (Note: This has since been improved.)
- Every second counts
- Don't consume taps securing an application that doesn't really need it (i.e. Reference Guides)
- Offer customization and streamlined pathways
- It's an ongoing tradeoff between security, features, time, and training

# InterSign and Pocket 7000 – The Decision to Extract or Emulate

## ■ Extracts (InterSign)

- Can be graphical and attractive
- Can employ a common user interface across several systems
- Used mostly for retrieval, order entry is more difficult
- Requires a lot of interfacing

## ■ Emulate entire session (Pocket 7000)

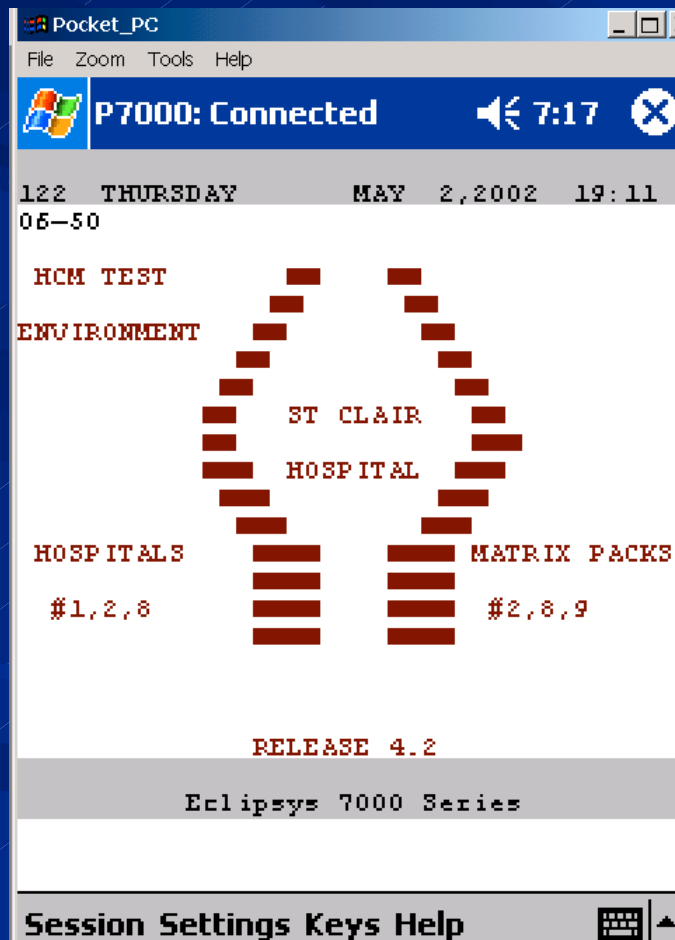
- Offers all functions, retrieval and order entry
- Requires no interfacing
- Requires little or no training
- Can be challenging to accomplish on a smaller screen
- Can be less visually appealing

# Pocket 7000

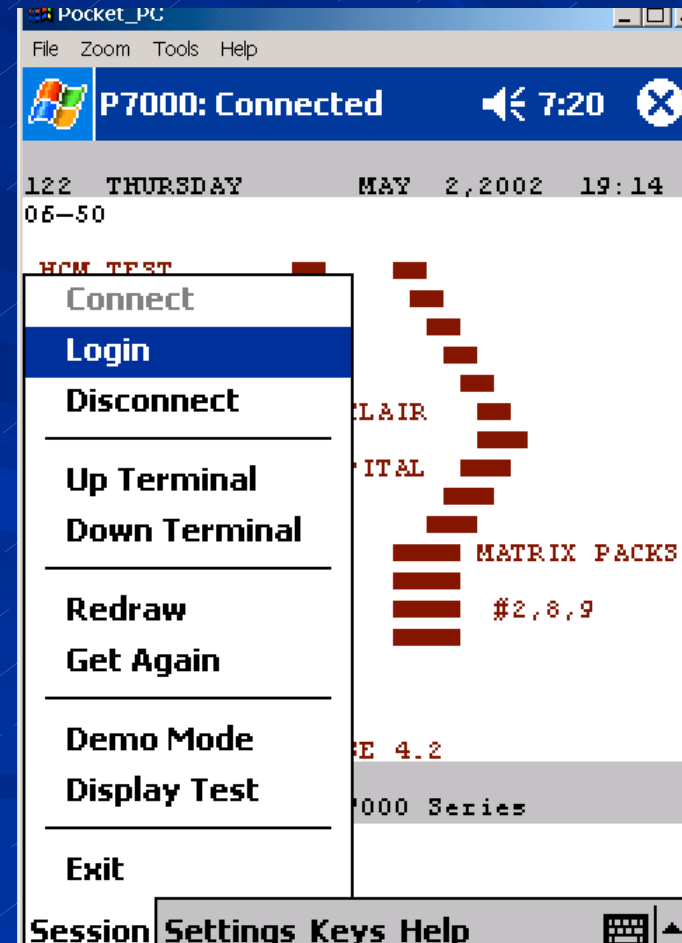
- Duplicates the Eclipsys 7000 session on a wireless Pocket PC
- Caregivers have access to clinical data from anywhere the hospital offers wireless coverage
- Virtually all existing matrix screens and pathways are compatible on the Pocket PC device
- Screen response time is < 1 second
- Supports video Reports
- Provides mobile or bedside order entry, result retrieval, vital sign entry, admission assessment, registration, charting, etc.

# Pocket 7000 Screens

## Hello Screen



## Initiate Login



# Pocket 7000 Screens (cont.)

Enter sign on code

Pocket\_PC  
File Zoom Tools Help

P7000: Connected 7:22

Sign on to E7000

Enter E7000

Force to Uppercase : ☒

OK Cancel

123 1 2 3 4 5 6 7 8 9 0 - = <

Tab q w e r t y u i o p [ ]

CAP a s d f g h j k l ; '

Shift z x c v b n m , . / <

Ctl áü ` \ ↓ ↑ ← →

Screen snapshots from an iPaq in an active Pocket 7000 session.

Pocket\_PC  
File Zoom Tools Help

P7000: Connected 7:31

SCHAEFFER, RICH RSAG.  
ENTERED FOR: PHYSICIAN GENERAL  
MD PATIENT LIST 05/02/02 19:25  
GENERAL STAFF

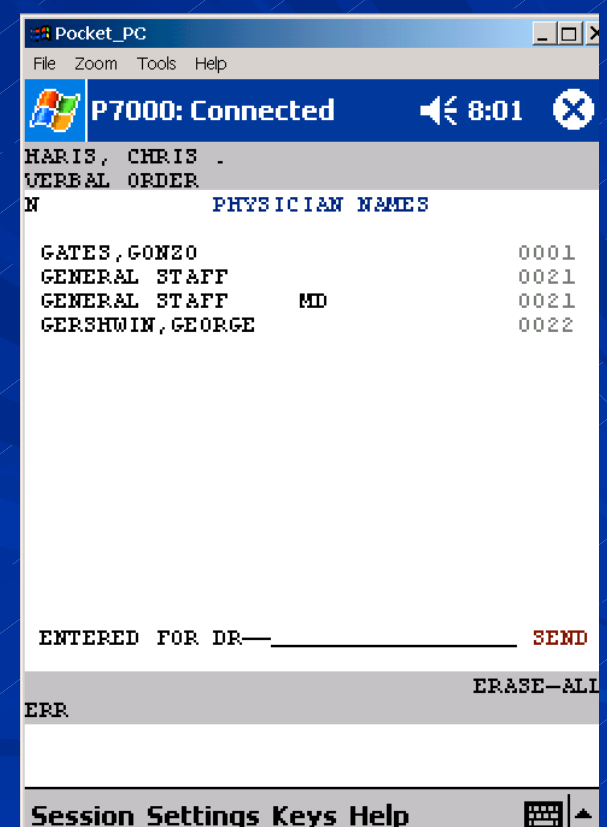
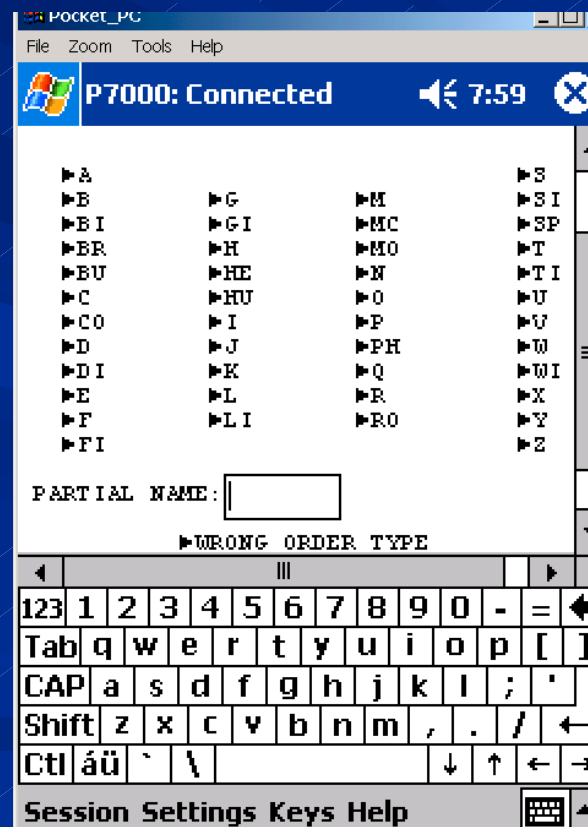
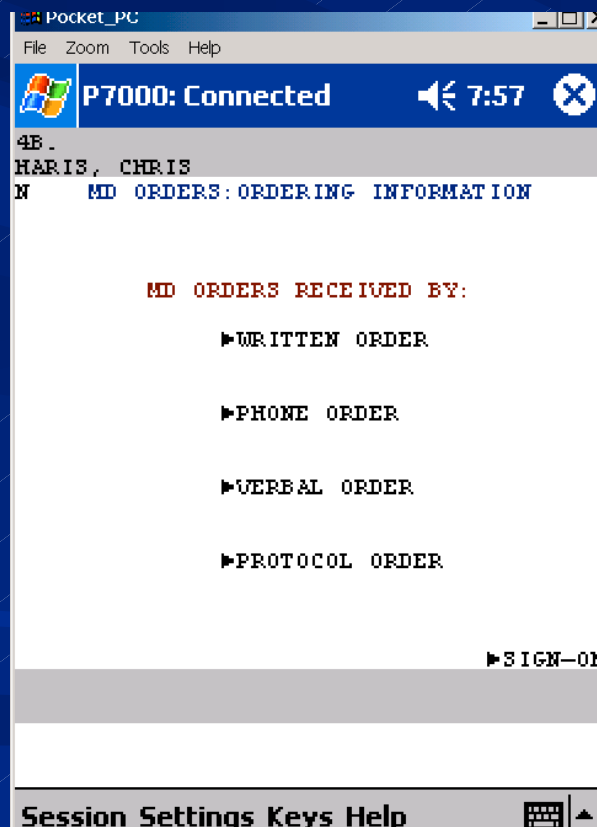
51185G APRILSHOWERS, BRIN	SIGN-IN
51175G BEDCENSUS, PULMONA	▶PT LOCATE
3002CV BRUELEV, BABY BOY	
42174B BRUELEV, OBSV	▶DR. LIST
42054B BRUELEV, SSOP	▶GROUP ACCESS
42074B BYTHEWAY, SIDE	
41034D CAKES, PATTY	▶QUICK REPORT
5803FC CRUELEV, BABY	▶INFO BY UNIT
42114B CRUELEV, OBSV	▶VIEW PPR
2401ER DIAG, NUMERIC	▶CASE HISTORY
7701IF DRUELEV, INFUS	▶VIEW MPI
4401IM DRUELEV, OBSV	▶MPI FIN REC
42024B DRUELEV, SSOP	▶REPORTS
51045G FACE, NAMECHG M	▶INFO-GRAM
51365F FIELD, FRANK	▶REQUEST-GRAM
	▶INFO GUIDE
	▶SCHEDULE CHT
	▶POS

ERR

Session Settings Keys Help

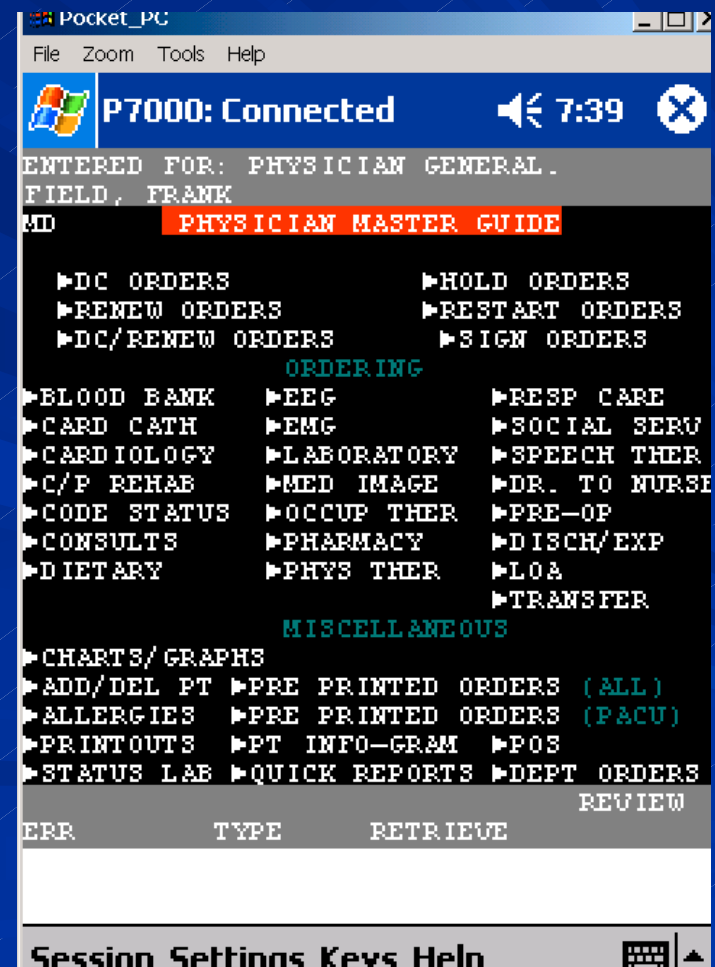
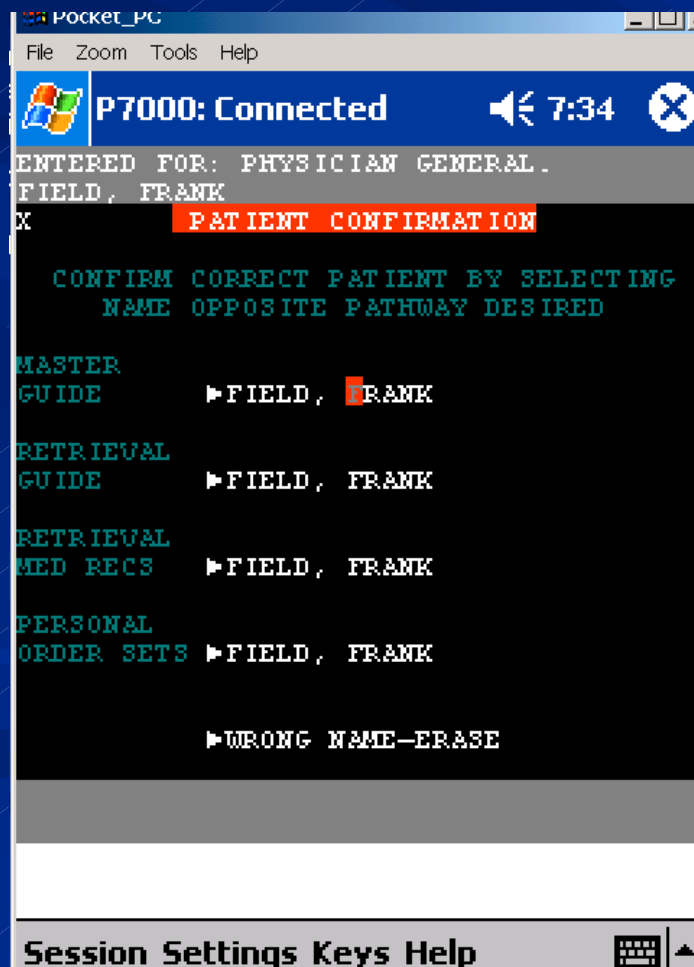


When a pathway includes a matrix that is coded for automatic cursor placement, Pocket 7000 pops up the on-screen keyboard. Likewise, when a user taps on an entry field an edit box is displayed and the cursor is active in the box awaiting keyboard clicks (see center screen). The keyboard is then minimized when typing is complete so that it doesn't obscure the screen.



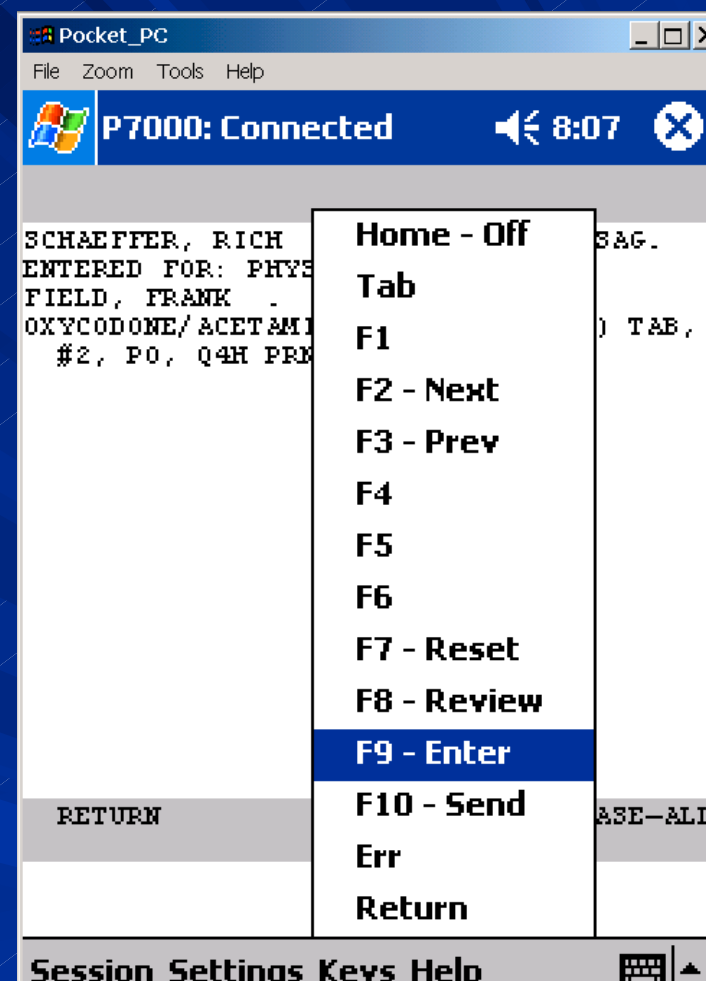
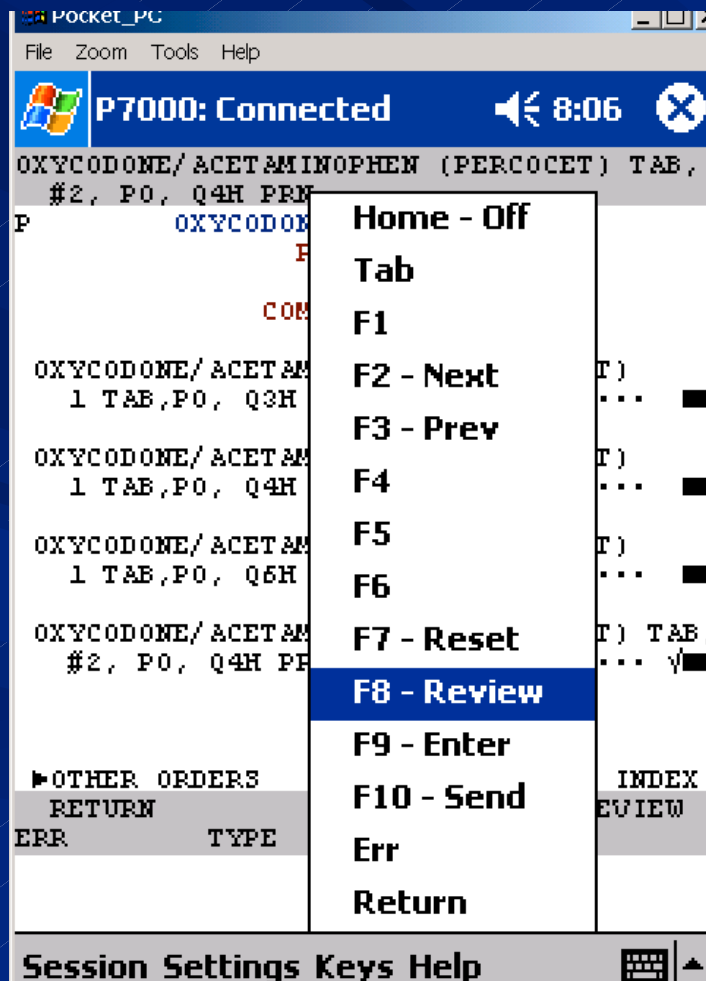
In surveying users, some felt the white on black was more readable. Readability is an important factor when the typeface is small. The goal is to configure the device with the smallest readable font so scrolling is eliminated, yet tapping is still achievable. Many color palettes are available.

To aid the user in performing accurate taps, the tap location changes color (note the 'F' in Frank). Likewise on a matrix that includes compound selections, the check marked selection will change to a red background (not shown on these screen snapshots).



Each time the user taps the screen Pocket 7000 emits a subtle beep to provide feedback to the user that the tap was accepted.

User continues to tap through the pathway. Response time is good at around 1 second per screen..



The user has the option of tapping the Review jump on the matrix, or tapping the Menu item called “Keys” and then tapping the function key. The keys menu is a good option when the on-screen keyboard is showing. It alleviates the need to scroll down underneath the keyboard to hit the jumps on the bottom lines. Err and Return are also available, sometimes eliminating the need to scroll. Likewise <Tab> works from the keyboard or the menu.

# Securing Wireless Data

- Significant precautions must be taken!
- Why?
  - Wireless data does 'leak' out of the hospital
  - Unauthorized capture of this data is possible
  - Standard encryption for wireless data has been broken

# Securing Wireless Data (cont.)

- 802.11b standard is rising in popularity
- As popularity rises, competition increases, and prices are driven down
- Wireless cards are inexpensive and come standard on many new laptops
- Wireless cards are easy to use
- 802.11b is intentionally interoperable
- One manufacturer's card is intended to work with any other access point
- Result: Lots of unauthorized users have wireless capabilities



# Securing Wireless Data (cont.)

- Activate the built-in features available with the wireless gear.
- Enable WEP
- 40-bit WEP vs. 128-bit WEP
- Change the SSID
- Change the default password
- Move AP off of the periphery
- Install any new AP on the interior
- Do a site survey at regular intervals
- Limit access to MAC addresses
- Consider disabling DHCP
- Consider a VPN to add an extra layer of encryption



# Security – Additional Steps

- Add stronger encryption software
- Rotate the decryption key frequently and at varying intervals
- Implement a means to revoke a device

# Pocket 7000 Encryption Keys

- Multiple layer – there are two different keys used, a large shared key, and a dynamically changing real-time key
- Multivariable – the rate at which the changing key changes is variable
- Lopsided – keys are mathematically uneven, and of different sizes
- Symmetric – the client and server use the same key set to communicate
- The “real time key” tells the client how to use the “shared key”.
- The server calculates a “real time key”, and communicates it to the client during the establishment of a connection.
- The client will periodically request “on-the-fly” changes to the real time key during its connection to the server, so its encryption behavior changes dynamically
- The frequency with which the client requests these “real time” key changes is also variable

# How to handle Roaming

- Nurses are frequently non-roaming, staying within a single nursing unit
- Physicians may visit many areas of the hospital.
- Physician usage requires roaming access
- Physician usage requires reports to follow them around the hospital

# Questions

## Contact information:

Thomas L. Ague

St. Clair Hospital

412-344-6600 x1000

[Tom.Ague@StClair.org](mailto:Tom.Ague@StClair.org)

Richard J. Schaeffer

St. Clair Hospital

412-344-6600 x1367

[Richard.Schaeffer@StClair.org](mailto:Richard.Schaeffer@StClair.org)